

Space Interferometry Mission: Flight System & Configuration Overview

Abstract - In 2009, NASA's Origins Program will launch the Space Interferometry Mission (SIM), a 10 meter baseline optical interferometry instrument, into an earth trailing solar orbit. This instrument will be comprised of four parallel optical interferometers whose prime mission objective is to perform astrometric measurements of unprecedented accuracy. Launched by the Space Shuttle and boosted into its final trajectory by an integral propulsion system, SIM will take data for more than five years in the search for extrasolar system planets.

NASA has assembled an integrated Jet Propulsion Laboratory (JPL) / Industry team to formulate a reference design to meet the SIM Science objectives. Unique technical challenges have proved to be a formidable task in numerous aspects of the system definition, from component development to system-level integration and test. Parallel activities to develop and test the necessary enabling technologies for SIM are coupled with the ongoing Flight System design.

The Flight System design poses unique challenges in many areas, including geometric aspects of the layout, stability of the precision structure, thermal control, active vibration suppression, picometer-level laser metrology, etc. System-level trade studies that balance the requirements of the Optics and Metrology layouts and develop clean interfaces are presented. Further, the issues of how the SIM Flight system is integrated, tested and validated against its performance specifications are addressed. Aspects of the use of detailed, integrated modeling of optical systems, structural dynamics and thermal control systems in order to validate the system level performance requirements are also discussed. This paper describes the current status of the SIM Reference System design.